MULTIMEDIA UNIVERSITY ™

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2021/2022

PPC0116 – PRE-CALCULUS

(All Sections / Groups)

3 OCTOBER 2022
2.30 p.m. – 4.30 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This examination paper consists of **3 printed pages** (including the cover page) with **4 questions only.**

2. Each question is worth **20 marks. Attempt ALL questions.**

3. Please write all your answers in the Answer Booklet provided. **Show all relevant steps** to obtain maximum marks.

Question 1 (20 marks)

(a) Solve $\left[(x+4)^2+2x\right]^{\frac{1}{3}}=-2$. [4 marks]

(b) Solve the inequalities below:

(i) $|2x-5|>5-x$. [3 marks]

(ii) $\frac{3}{x+3}<2$ by using test interval method. [4 marks]

Write your final answer in interval notation.

(c) Simplify the following expressions:

(i) $\left(a^{\frac{1}{3}}-b^{\frac{1}{3}}\right)\left(a^{\frac{2}{3}}+a^{\frac{1}{3}}b^{\frac{1}{3}}+b^{\frac{2}{3}}\right)$. [4 marks]

(ii) $\frac{(3i-1)i}{4i}+3i^{10}-\frac{2-5i}{2+i}$ [5 marks]

Question 2 (20 marks)

(a) A function $f(x)$ is defined as:

$$f(x)=\begin{cases}|x+4|, & \text{for } -6\le x<0,\\ 2, & \text{for } 0\le x<2,\\ (x-1)^2, & \text{for } 2<x\le 4.\end{cases}$$

(i) Evaluate $f(-2)+f(3)$. [2 marks]

(ii) Sketch the graph of $f(x)$. [5 marks]

(iii) State the domain and range of $f(x)$. [2 marks]

(iv) Find the x- and y- intercepts of $f(x)$. [2 marks]

(v) Find $\left(\frac{f}{g^{-1}}\right)(3)$, given that $g(x)=\frac{1}{2x-4}$. [4 marks]

(b) Sketch the graph of $f(x)=\sqrt{3-x}+2$. For each stage of the transformation, state the transformation involved and sketch the corresponding graph. [5 marks]

Continued...

Question 3 (20 marks)

(a) Use long division method to perform the division for $f(x)=\dfrac{2x^4+4x^3-2x^2-3}{(x-1)(x+2)}$ to find the quotient and remainder. [5 marks]

(b) Given a function $f(x)=2x^8-37x^5+2x^4-16x^2+3$, use synthetic division method to find the remainder if $f(x)$ is divided by $x-2$. Use the Remainder Theorem to verify the answer. Also state the coefficient of x^3 in the quotient. [6 marks]

(c) Given the rational function

$$f(x)=\frac{x^2}{(x-4)(x^2+4x+4)},$$

use partial fraction decomposition to show that it can be written in the form of

$$f(x)=\frac{5}{9(x+2)}-\frac{2}{3(x+2)^2}+\frac{4}{9(x-4)}.$$

[9 marks]

Question 4 (20 marks)

(a) Determine whether the following series is arithmetic that has common difference or geometric that has common ratio. Then, compute the sum of the series by using appropriate formula.

(i) $4+10+16+22+.....+118$ [5 marks]

(ii) $3+\dfrac{3}{4}+\dfrac{3}{4^2}+\dfrac{3}{4^3}+.....$ [3 marks]

(b) An international club wants to organise a contest that has ten cash prizes totalling RM21000. The winner of the tenth prize receives RM1200 and the difference between successive prizes are the same. Find the values of the fifth prize of the contest. [5 marks]

(c) Use the Binomial Theorem to expand $\left(1+\dfrac{3}{2}x\right)^8$ in ascending powers of x up to and including the term in x^3. Then find the coefficient of the last term. [7 marks]

End of Paper